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46. (New) The rotating electric machine of Claim 37, wherein the inner semiconducting layer, the insulating layer and the outer semiconducting layer are made of materials having an E-modulus.--

REMARKS

Favorable reconsideration of the application as presently amended and in view of the following discussion is respectfully requested.

Claims 25-46 are pending, Claims 1-20 and 22-24 having been canceled without prejudice or disclaimer, and Claims 25-46 having been added by way of the present amendment.

In the outstanding Office Action, a new title was required; the specification was objected to as containing informalities; Claims 1, 14, 16, 17, and 24 were rejected under 35 U.S.C. §112, second paragraph; Claim 24 was rejected under 35 U.S.C. §112, first paragraph; Claims 1-3, 5, 6, 10, 19, 20, and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Shildneck (U.S. Patent No. 3,014,139) in view of Aimar (U.S. Patent No. 4,161,669); Claim 4 was rejected under 35 U.S.C. §103 as being unpatentable over Shildneck in view of Aimar and further in view of Siemens (UK Patent No. 468,827); Claim 11 was rejected under 35 U.S.C. §103(a) as being unpatentable over Shildneck in view of Aimar and Elton et al.(U.S. Patent No. 4,853,565, hereinafter Elton '565); Claim 12 was rejected under 35 U.S.C. §103(a) as being unpatentable over Shildneck in view of Aimar and Elton '565 and further in view of Takaoka et al. (U.S. Patent No. 5,094,703, hereinafter Takaoka); Claims 13, 14, 16-18, and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Shildneck in view of Aimar and Elton '565 and further in view of Elton et al. (U.S. Patent No. 4,622,116, hereinafter Elton '116); Claims 15 and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Shildneck in view of Aimar and Elton '565 and Haxton

(U.S. Patent No. 5,902,958); and Claims 7-9 were indicated as containing allowable subject matter.

Applicants appreciatively acknowledge the indication of allowable subject matter.

In response, a new title has been provided by way of the present amendment. Also, the specification has been amended to correct the informalities identified in the outstanding Office Action. No new matter has been added.

In response to the rejection of Claims 1, 14, 16, 17, and 24 under 35 U.S.C. §112, second paragraph, Claims 1-20, and 22-23 have been canceled without prejudice or disclaimer and rewritten as new Claims 25-46, respectively, consistent with 35 U.S.C §112, second paragraph and U.S. claim drafting practice. New Claims 25-46 are thus believed to be definite under 35 U.S.C. §112, second paragraph, and the outstanding rejection on that basis is believed to have been overcome. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned so that mutually agreeable claim language may be identified. New Claims 25-46 are believed to find support in the specification as originally filed, including the claims, and thus no new matter is added.

Claim 24 has been canceled without prejudice or disclaimer by way of the present amendment. Accordingly, the rejection of Claim 24 under 35 U.S.C. §112, first paragraph is moot.

New independent Claim 25 is directed to a rotating electric machine having a stator with a plurality slots, and a winding of a high-voltage cable drawn through the slots. At least one of the slots includes a cuff between the high-voltage cable and an inside surface of the slot at an end surface of the stator. The cuff is configured to extend axially from the end surface of the stator into the slot.

Canceled Claims 1-3, 5, 6, 10, 19, 20 and 22 were rejected based upon a hypothetical machine having a stator and a stator winding according to the machine in Shildneck, and an

insulating assembly for the stator slots according to Aimar. Applicants respectfully traverse this rejection.

Shildneck describes a low-voltage, high-current machine with unconventional windings. As shown in Figures 1-4, the outermost layer of the winding in Shildneck (i.e., element 8 in Figures 1-4) is made of an insulation material.[1] For higher voltages (say over 5 kV – depending of the insulator material used and insulation thickness), it is necessary to take steps to eliminate corona between an insulated conductor and a metallic member. Such corona will form in any small air pocket between the insulation material and stator slot, provided that sufficient voltage (3 kV/mm which is the condition for forming a partial discharge path in air) appears across the air space. This is, for example, discussed in US Patent No. 2,613,238, a patent cited by Shildneck (col. 1, line 60). It is known to paint a surface of insulated conductors lying in core slots of large electrical machines with semi-conducting material to establish a sheath of reasonably uniform potential at the winding within the stator slot. Despite the fact that this is known, Shildneck does not address the problem of corona discharge, which to some extent could be reduced by using thicker insulation. Instead, one object of Shildneck is to reduce the thickness required in the ground insulation (by providing a round conductor).

In machines operating at higher voltages, such as conventional machines which normally operate between 10 and 20 kV, sometimes up to 30 kV, the end portion of the winding is normally provided with an E-Field control in the form of so-called corona protection varnish intended to convert a radial electric field into an axial field, which means that the insulation on the end-winding region is subject to a high potential relative to ground. The E-field control evens out the dielectric stress of the insulating material in the end-

[1]See Shildneck, column 3, lines 60-63.

winding region, but an electric field concentration is still a severe problem in electrical machines operating at these higher voltages.

Shildneck does not have any E-field control, which is not surprising for machines that are configured to operate at lower voltages, such as the machine in Shildneck. Conventional insulation of conductors in electrical machines (such as so-called mica-tape) is produced to some extent to provide resistance to partial discharge. If the ground insulation material as used by Shildneck (silicon rubber), were subjected to partial discharge, it would eventually lead to a deterioration of the insulation material. Also, if the machine in Shildneck were operated at voltage levels of higher voltage conventional machines, the uncontrolled electric field in the end-winding region would also result in high electric field concentrations causing a high dielectric stress of the insulation material, leading to a deterioration of the insulation material, and eventual breakdown of the machine. Accordingly, it is respectfully submitted that the cable used in the machine in Shildneck and the machine itself are designed for operation only at low voltages. Moreover, there is nothing in Shildneck suggesting a desirability to modify the cable and/or machine to operate at higher voltages.

Furthermore, Shildneck does not disclose providing a cuff between the high-voltage cable winding and an inside surface of the stator slots. Moreover, there is nothing in Shildneck suggesting a desirability to modify the configuration of the stator of the machine.

Aimar is asserted for its teaching of providing an insulating assembly for the stator slots of a machine. However, Aimar does not teach or suggest what is also lacking in Shildneck, namely, having a high-voltage cable as a stator winding that is drawn through the slots of the stator. Furthermore, there is nothing in Aimar suggesting a desirability for using a high-voltage cable as a stator winding.

The outstanding Office Action asserts that the motivation for combining Shildneck and Aimar would be to "provide support for the stator end turn windings as well as forming

an insulating portion between the inner wall of the slots and the stator winding."[2] However, as discussed above, there is nothing in Shildneck to indicate desirability to modify the stator as suggested in the Office Action.

Consequently, it is respectfully submitted that no matter how Shildneck is combined with Aimar, the proposed combination fails to teach or suggest the invention defined by new independent Claims 25 and 43, or new Claims 26-42, and 44-46, dependent therefrom.

Siemens is asserted in the rejection of canceled Claim 4 for its teaching of forming a stator slot having a profile including wide and narrow parts. Aside from the shape of the stator slot, there is nothing in Siemens that would cure the above-described deficiencies regarding the proposed combination of Shildneck and Aimar. Consequently, it is respectfully submitted that no matter how Shildneck is combined with Aimar and Siemens, the proposed combination fails to teach or suggest the invention defined by new independent Claims 25 and 43, or new Claims 26-42, and 44-46, dependent therefrom.

Elton '565 is asserted in the rejection of Claim 11 for its teaching of a cable having stranded conductors surrounded by a first inner semiconducting insulating layer, an intermediate solid insulation layer, and an outer semiconducting insulation layer connected to ground. However, Elton '565 does not teach or suggest what is also lacking in Shildneck and Aimar, namely, having a high-voltage cable as a stator winding that is drawn through the slots of the stator. Furthermore, there is nothing in Elton '565 suggesting a desirability for using a high-voltage cable as a stator winding. The outstanding Office Action asserts that the motivation for combining Shildneck, Aimar, and Elton '565 would be to "prevent corona discharge from the winding."[3]

The invention of Elton '565 is about an insulator material, namely, a pyrolyzed glass fiber layer that may be used in a variety of applications. For example, Elton '565 describes

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[2] See Office Action dated January 12, 2001, at numbered paragraph 8, page 4.

surrounding conventional bar-type windings of an electric machine with a layer of pyrolyzed glass fiber in electrical contact with ground to minimize corona discharge by providing a path to ground to bleed off built up charges.[4] Elton '565 also describes using a semiconducting pyrolyzed glass fiber layer to equalize the potential on the exterior of the insulator of a cable.[5] Elton '565 describes yet another application of the pyrolyzed glass fiber layer as a way to protect electronic components by coating the exterior surface of a housing with the semiconducting pyrolyzed glass fiber.[6]

Elton '565 does not teach or suggest that the cable shown in Figure 7 could be used as a winding in an electric machine. On the other hand, the cable in Elton '565 is but one of several exemplary applications of the pyrolyzed glass fiber layer described in Elton '565. It appears to be completely coincidental that Elton '565 uses a winding and also a cable (as well as a chassis for an electric circuit) as exemplary uses for the pyrolyzed glass insulator material. There is nothing in Elton '565 to suggest a desirability of using the cable shown in Figure 7 of Elton '565 as a substitute for a conventional bar-type winding in an electric machine.

With regard to the stator winding embodiment, Elton '565 recognizes that in the end-winding region, just outside of the stator of an electric machine, there will be problems caused by strong electric fields. As a solution, Elton '565 uses a known grading near the stator to allow some of the accumulated charge to bleed off to the stator, thus reducing the risk of arcing, but Elton '565 offers no other solutions to the problems in the end-winding region. The strong electric fields will be present throughout the end-winding region, not just near the stator. The grading used in Elton '565 will help to lessen the effects of the strong electric fields near the stator, but will not address the problems in the end-winding region

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[3] See Office Action dated January 12, 2001, at numbered paragraph 10, page 6.
[4] See Elton '565, column 2, lines 44-48, and Figures 1-6.
[5] See Elton '565, column 7, lines 12-17, and Figure 7.

away from the stator. Elton '565 uses rigid bar-type windings that are able to withstand mechanical stresses caused by induced fields between the windings in the end-winding region, where electromagnetic fields are not contained in the winding. The mechanical rigidity of the bar-type windings suppresses the amount of vibration in the end-winding region that would otherwise be present. The fact that a grading system is used to lessen the end-winding region problems near the stator in Elton '565 is further evidence that Elton '565 does not suggest using the cable of Figure 7 as a winding of a machine, since such a cable would not have a grading.

The "invention" in Elton '565 is the pyrolyzed glass fiber layer. Elton '565 describes a process of immersing the winding portions in a bath of resin and vacuum pressure impregnating (VPI) the resin in the winding.[7] The VPI process results in a cured resin having no voids or gaps between layers.[8] The cured resin is a hard material, which is an important observation, since the flexible winding of Shildneck would be replaced with a pyrolyzed glass-based cable of Elton '565.

The cable shown in Figure 7 of Elton '565 includes two pyrolyzed glass fiber layers, layers 104 and 110.

> The internal grading layer 104 is a semi-conducting pyrolyzed glass fiber layer as disclosed herein . . .. An insulation 106 surrounds internal grading layer 104. On the external surface of insulation 106, a semi-conducting pyrolyzed glass fiber layer 110 equalizes the electrical potential thereon.[9]

As further evidence that the cable shown in Figure 7 Elton '565 would not be suitable as a winding in an electric machine, having two cured, pyrolyzed glass fiber layers would cause the cable to be prohibitively stiff for winding through the stator slots. It may be possible to VPI the entire stator in a large resin bath after it had been wound with a flexible

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[6]See Elton '565, column 7, lines 38-43, and Figure 8.
[7] See Elton '565, column 4, lines 23-25.
[8] See Elton '565, column 4, lines 27-30.

cable. However, such a process would be ineffective for applying and curing the resin for both the internal grading layer 104 and the external layer 110, since an insulation layer 106 surrounds the internal grading layer 104. It would not be possible to expose both layers 110 and 104 to the resin. Accordingly, while Elton '565 describes how to provide a pyrolyzed glass fiber layer for a bar-type winding, Elton '565 does not teach or suggest that the cable of Figure 7 could be used for such a purpose, especially since the cable in Elton would be stiff, not flexible once the pyrolyzed glass material is cured.

Consequently, it is respectfully submitted that no matter how Shildneck is combined with Aimar and Elton '565, the proposed combination fails to teach or suggest the invention defined by new independent Claims 25 and 43, or new Claims 26-42, and 44-46, dependent therefrom.

Takaoka is asserted in the rejection of canceled Claim 12 for its teaching of selecting a particular diameter of the conductor based on the amount of power that is to be transmitted. Aside from the conductor diameter, there is nothing in Takaoka that would cure the above-described deficiencies regarding the proposed combination of Shildneck, Aimar, and Elton '565. Consequently, it is respectfully submitted that no matter how Shildneck is combined with Aimar, Elton '565, and Takaoka, the proposed combination fails to teach or suggest the invention defined by new independent Claims 25 and 43, or new Claims 26-42, and 44-46, dependent therefrom.

Elton '116 is asserted in the rejection of canceled Claims 13, 14, 16-18 and 24 for its teaching of forming different overlapping layers of insulation with the same coefficient of thermal expansion in order to prevent thermal stress that would lead to the materials cracking and separating causing a failure in the insulation. Aside from the coefficient of thermal expansion, there is nothing in Elton '116 that would cure the above-described deficiencies

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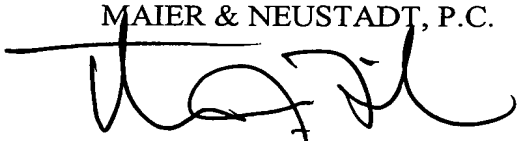
[9] See Elton '565, column 7, lines 19-26.

regarding the proposed combination of Shildneck, Aimar, and Elton '565. Consequently, it is respectfully submitted that no matter how Shildneck is combined with Aimar, Elton '565, and Elton '116, the proposed combination fails to teach or suggest that invention defined by new independent Claims 25 and 43, or new Claims 26-42, and 44-46, dependent therefrom.

Haxton is asserted in the rejection of canceled Claims 15 and 23 for its teaching of using a material for the layers of a cable having a modulus of elasticity of less than 500 MPa. Aside from the modulus of elasticity, there is nothing in Haxton that would cure the above-described deficiencies regarding the proposed combination of Shildneck, Aimar, and Elton '565. Consequently, it is respectfully submitted that no matter how Shildneck is combined with Aimar, Elton '565, and Haxton, the proposed combination fails to teach or suggest the invention defined by new independent Claims 25 and 43, or new Claims 26-42, and 44-46, dependent therefrom.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that the invention defined by new Claims 25-46 is definite and patentably distinguishing over the prior art. The present application is therefore believed to be in condition for formal allowance and an early and favorable reconsideration of this application is respectfully requested.

Respectfully submitted,
OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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IN THE TITLE

Please amend the title as follows:

Page 1, lines 1-2:

A ROTATING ELECTRIC MACHINE AND METHOD OF MANUFACTURING SUCH A MACHINE HAVING A CUFF BETWEEN THE STATOR AND A HIGH-VOLTAGE CABLE WINDING AT AN OPENING OF A STATOR SLOT--.

IN THE SPECIFICATION

Please amend the specification as follows:

Page 1, lines 5-10:

In a first aspect the present invention relates to a rotating electric machine of the type described [in the preamble of claim 1] herein, such as synchronous machines and normal asynchronous machines as well as dual-fed machines, applications in asynchronous static current converter cascades, outer pole machines and synchronous flow machines.

Page 1, lines 12-13:

In a second aspect the invention relates to a method of [the type described in the preamble to claim 13] manufacturing a rotating electric machine such as the type described herein.

Page 4, lines 4-8:

According to a first aspect of the invention this is achieved by providing a rotating electric machine [of the type described in the preamble to claim 1 with the special features defined in the characterizing part of this claim] having a stator with a winding drawn through slots of the stator, the windings being a high-voltage cable, and the slots having a cuff

between the stator and the winding at least one end of the stator, the cuff extending axially into the slot.

Page 9, delete lines 4-6 in their entirety.

Page 9, lines 8-12:

In a second aspect of the invention the object striven for is achieved by a method of manufacturing a rotating electric machine of the type described [in the preamble to claim 19 including the specific measures defined in the characterizing part of this claim] above.